

CLIMATE ENERGY FINANCE

Tim Buckley, Director

tim@climateenergyfinance.org

www.climateenergyfinance.org

**Renewable Energy &
Critical Minerals
Superpower**

**Altius Sustainability
Advisory Committee**

24 August 2023

The challenge facing Australian industry policy in light of the US IRA

1. The Global Energy Transition
2. Energy Transition: China leads the world; and this is a global technology and investment race
3. The US IRA Changes Everything – A race to the top
 - South Korea re batteries
4. The Australia-US Compact: Climate change, critical minerals and clean energy is the third pillar of the Australia-US alliance; Australia's Critical Minerals Strategy; Australian Exports – Embodied Decarbonisation
5. Stock market examples of Energy Transition

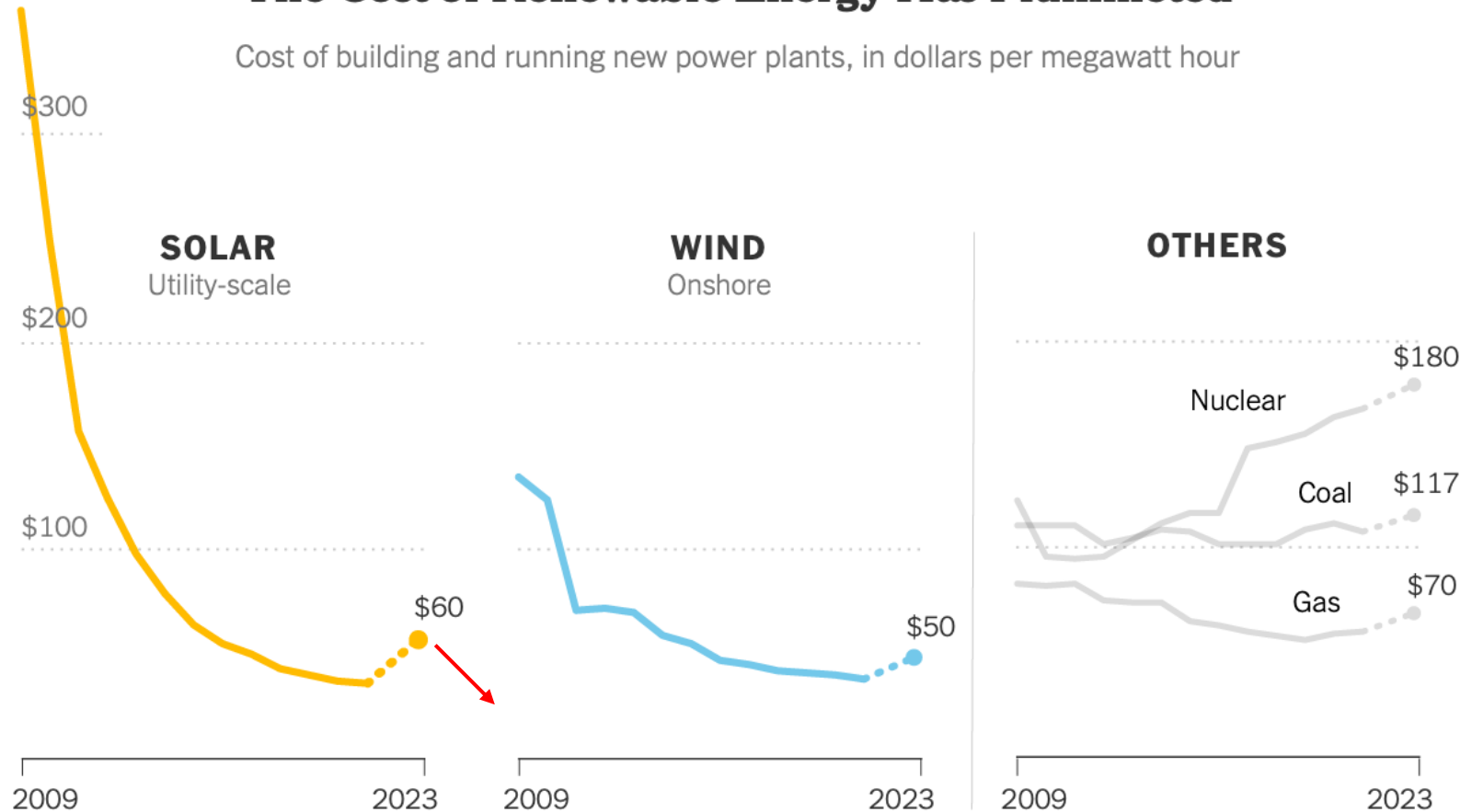
Australia needs another \$100bn of public strategic capital to crowd-in \$200-300bn of private capital

1. The Global Energy Transition

The move to zero emissions renewable energy is deflationary, in absolute terms, and recently relative to hyperinflation of fossil fuel commodities.

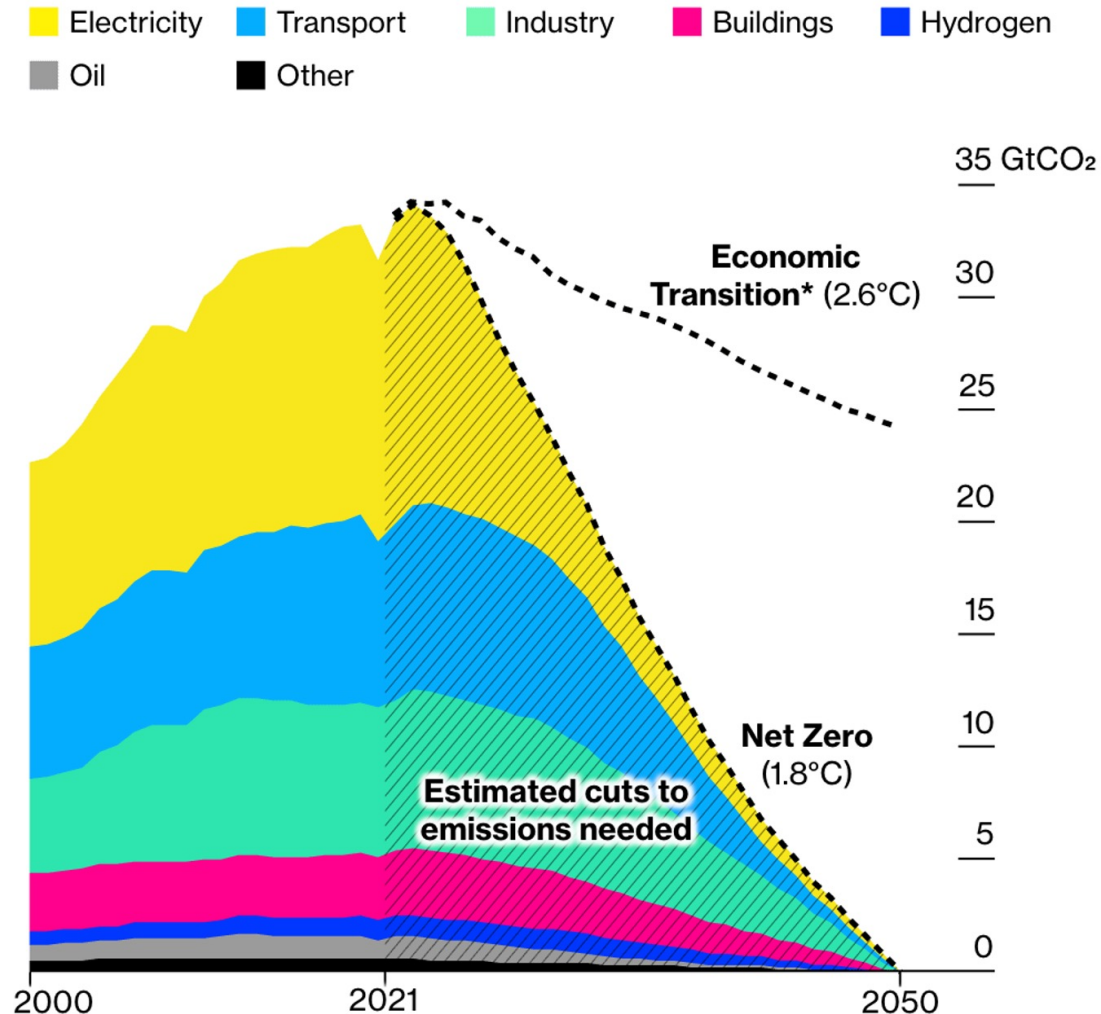
The Cost of Renewable Energy Has Plummeted

Cost of building and running new power plants, in dollars per megawatt hour



1. The Global Energy Transition

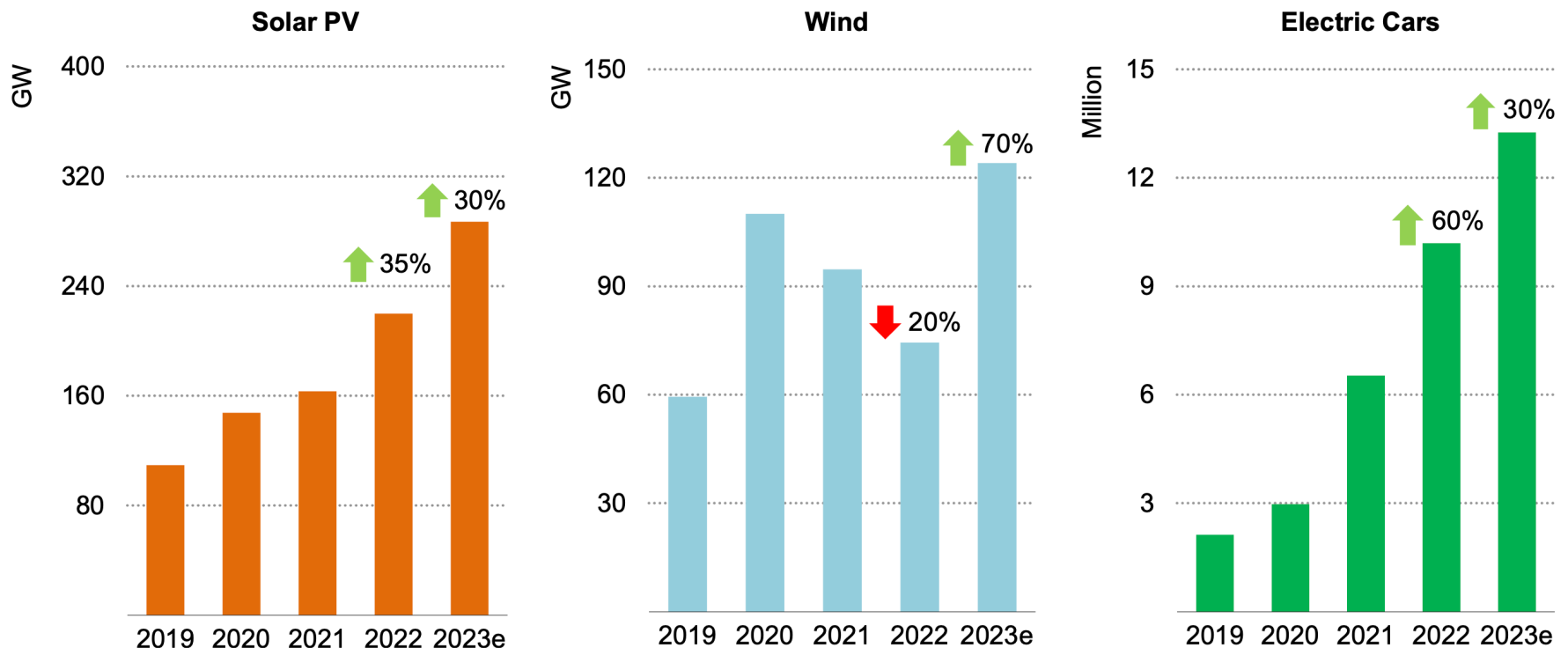
Emissions must fall to zero by mid-century to meet global target



1. The Global Energy Transition

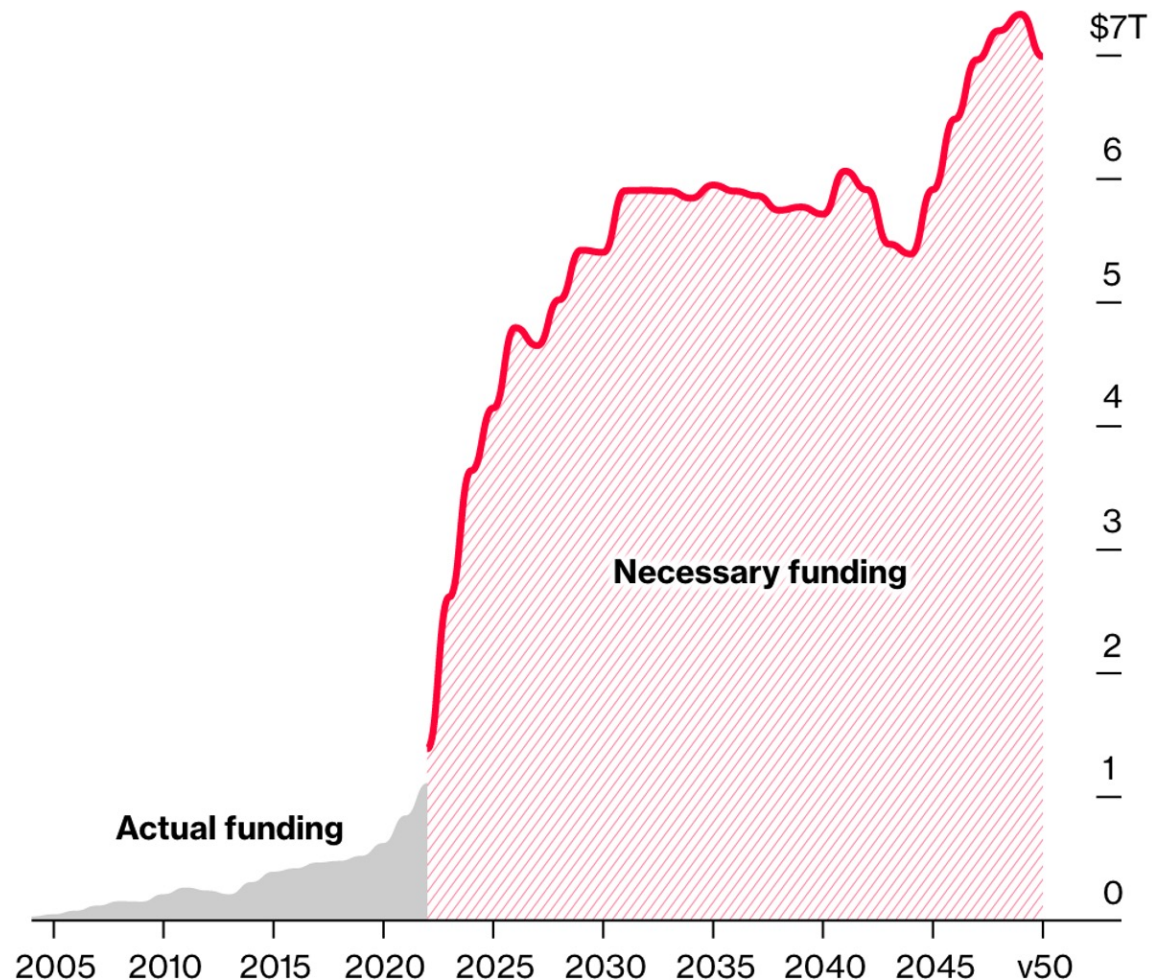
There is nothing slow, orderly or ambiguous about global momentum in the energy transition

Annual capacity additions for solar PV and wind and electric car sales



1. The Global Energy Transition

Global Investment Needed to reach Net Zero by 2050



2. China Leads the World in Renewable Energy

China installed 108GW of Wind and Solar in 1HCY2023, and is on track to deliver their 1,200GW by 2030 RE target 6 years early

New Capacity Installed in China in Jan-June 2023

		Jan-June 2023	Share of new adds (%)	Change (yoy %)	Jun-23	Share of new adds (%)
Thermal Power	GW	26	18%	97%	4.0	13%
Hydropower	GW	5	4%	-43%	1.0	3%
Nuclear Power	GW	1	1%	-48%	0.0	0%
Wind Power	GW	23	16%	78%	6.6	22%
Solar Power	GW	78	56%	154%	17.2	57%
Other (Biomass, W2E)	GW	7	5%		1.6	5%
Total capacity added	GW	141	100%	104%	30.4	100%
Variable Renewable adds	GW	108	77%	112%	25.4	83%
Zero Emissions Capacity Adds	GW	115	82%	106%	26.4	87%

Source: NBS, CEF Estimates

2. China Leads the World in EVs

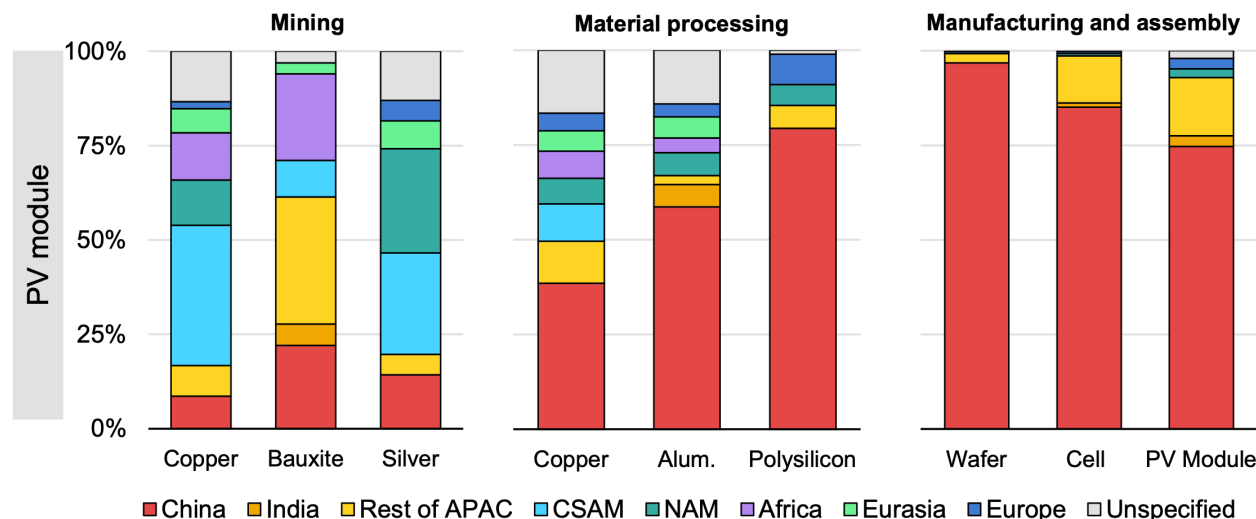
China EV share in June 2023 was 34% of total passenger sales.
And Year to date China EV sales +44% yoy.

China Automobile Sales	Jun-23	YoY	Market Share	YTD 2023	YoY	Market Share
Domestic						
Passenger Vehicles	2,268,000	5%		11,268,000	10%	
EVs	767,000	35%	34%	3,577,000	44%	32%
<i>of which BEVs</i>	535,000	19%	24%	2,555,000	31%	23%
<i>of which PHEVs</i>	232,000	93%	10%	1,022,000	91%	9%
Export						
Passenger Vehicles	312,000	58%		1,780,000	88%	
<i>of which EVs</i>	75,000	176%	24%	516,000	164%	29%

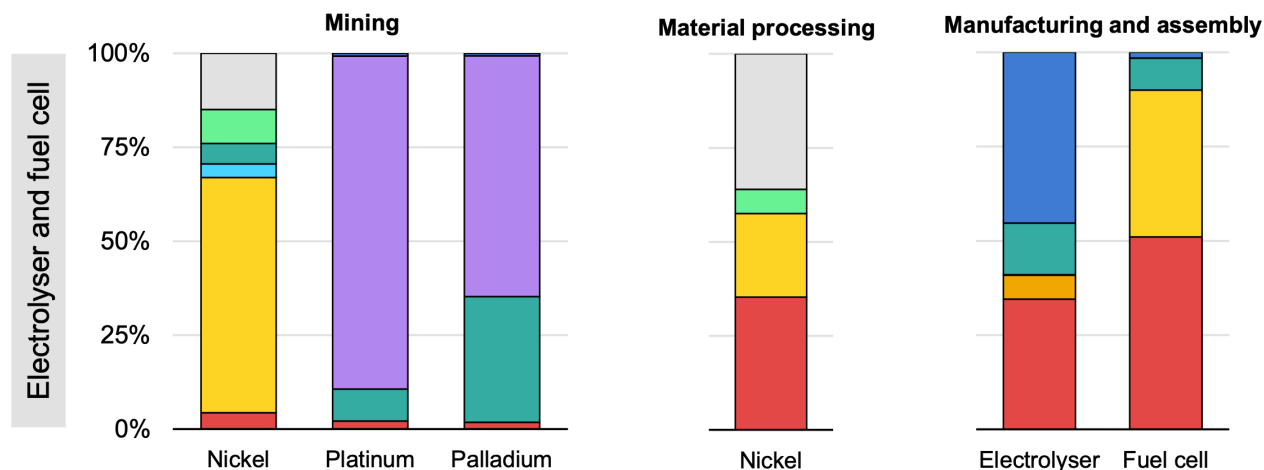
Source: China Association of Automobile Manufacturers, Climate Energy Finance calculations

2. China Leads the World on Mineral Processing

Supply chain security, cheap RE and resource ownership means Australia should be leveraging our new competitive advantages to lead the global energy transition



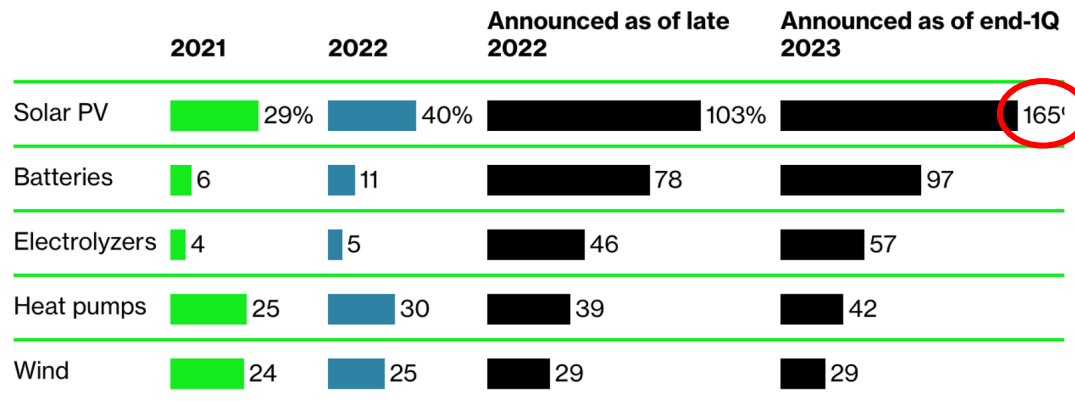
Think
'China +1'



2. China Leads the World in Renewable Energy

Solar manufacturing scaling up at unbelievable speed

Installed and announced manufacturing capacity, relative to 2030 levels needed in IEA net zero scenario



Think of ~1,000GW pa of solar installs globally by 2030

The IEA APS assumes 290GW pa 2022-2030 (~400GW by 2030);

NZE scenario assumes 462GW pa 2022-2030 (~600GW by 2030)



Massive PV Manufacturing Complex In China

JinkoSolar Plans RMB 56Bn Vertically Integrated Solar PV Production Compound In Shanxi

25 May 25 2023 Taiyang News

- JinkoSolar has entered an investment framework agreement for a large scale manufacturing complex in Shanxi
- It will host monocrystalline silicon pull rod, silicon wafer, high efficiency solar cells and modules with 56 GW annual capacity each
- Phase I and II with 14 GW capacity for each of the products are planned to enter commercial operations in Q1 and Q2 of 2024

Source: Bloomberg, Multiplying Solar and Battery Factories Put Net Zero in Closer Reach, 25 May 2023

https://www.bloomberg.com/news/articles/2023-05-25/boom-in-solar-panel-ev-battery-factories-brings-net-zero-closer?utm_source=website&utm_medium=share&utm_campaign=twitter&leadSource=verify%20wall

China's Taiyangnews, 25 May 2023, <https://taiyangnews.info/business/massive-pv-manufacturing-complex-in-china/>

3. US Inflation Reduction Act 2022

~US\$800bn funding => a resurgence in US manufacturing post the IRA



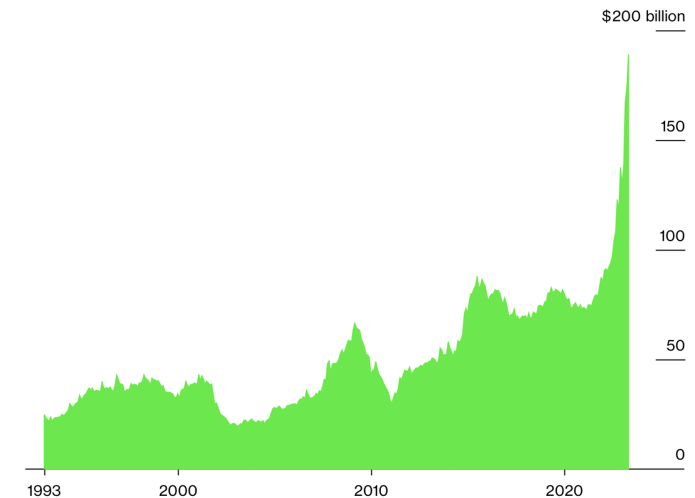
THE WHITE HOUSE

JULY 05, 2023

FACT SHEET: Bidenomics Has Driven \$500 Billion in Private Sector Investments Across the Country, Is Growing South Carolina's Economy From the Middle Out and Bottom Up

President Biden's economic agenda—Bidenomics—is growing the American economy from the middle out and the bottom up, not the top down. Tomorrow, President Biden will announce that companies have committed **over \$500 billion in manufacturing and clean energy investments** in the United States since the beginning of his Administration. The President will visit **South Carolina, where companies have announced \$11 billion** in manufacturing and clean energy investments, and the Biden-Harris Administration has already awarded **\$2.6 billion in funding for infrastructure projects**. The President will highlight that Enphase Energy is joining a growing list of companies beginning clean energy manufacturing operations in the United States—mobilized directly by President Biden's Inflation Reduction Act—**creating 1,800 new jobs nationwide, including up**

Figure: US Private Construction by Manufacturers



Source: US Census Bureau, [Bloomberg](#)

3. Korea's Refocus on the US IRA

Battery Makers Plow \$31 Billion Into Remaking Korean Steel Hub

The city of Pohang built up a world class steel industry over decades. Now it's turning to EV batteries.



The sun sets over the Posco steel mill in Pohang, South Korea, on July 17, 2018. The city is increasingly seen as the country's new capital for the electric vehicle battery industry.

A South Korean city home to one of the world's biggest steelmakers is betting its manufacturing expertise, billions of dollars in investments and government incentives can help it dominate a 21st century industry: electric vehicle batteries.

Companies in the south-eastern hub of Pohang — famous for **Posco Holdings Inc.** steel mills and one of the country's elite universities — are aggressively building out EV battery campuses as automakers hurry to find reliable suppliers outside China. Three South Korean giants in the global battery market — LG Energy Solution Ltd., Samsung SDI Co. and SK On Co. — have promised 40 trillion won (\$31 billion) in domestic investments with their local suppliers.

President Yoon Suk Yeol said 'the government and companies including Samsung Electronics Co. will pour US\$422bn into areas such as chips and EV in the nation's most aggressive effort yet to win a heated global race for tech supremacy'

Source: Bloomberg's Heejin Kim 16 March 2023
<https://www.bloomberg.com/news/articles/2023-03-15/battery-makers-plow-31-billion-into-remaking-korean-steel-hub>

4. Australia's Critical Minerals Strategy

South Korea-Australia Integrated Mining-Batteries-EV Cooperation

29 June 2023



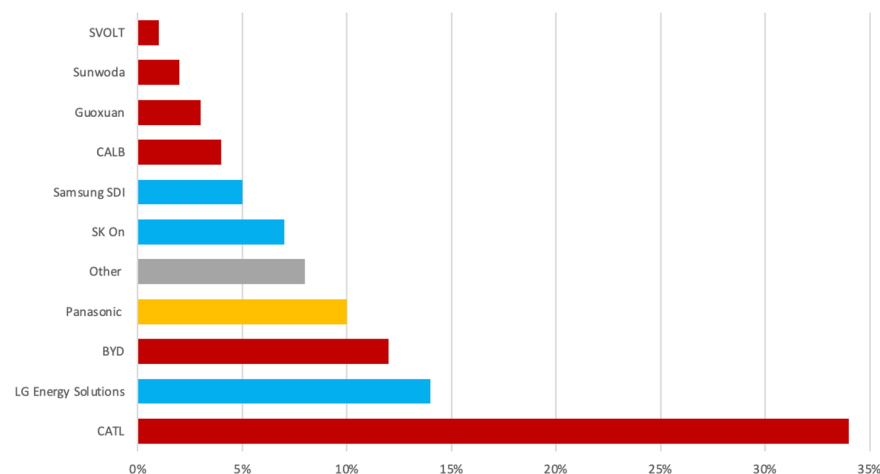
CLIMATE ENERGY FINANCE

A VALUE-ADDED CRITICAL MINERALS BILATERAL AGREEMENT FOR AUSTRALIA AND SOUTH KOREA

Australia's imperative to create a mutually-beneficial bilateral agreement with South Korea, leveraging the US Inflation Reduction Act to complement Korea's battery industry and value-add onshore

Matt Pollard, Global EV Supply Chain Analyst, CEF
Tim Buckley, Director, CEF
Dr Annemarie Jonson, Director Communications

Figure: Global EV Battery Manufacturer Market Share 2022:



Source: SNE Research, CleanTechnica

4. Australia-US Compact

Climate change, critical minerals and clean energy is third pillar of the Australia-US alliance



THE WHITE HOUSE

MAY 20, 2023

Australia-United States Climate, Critical Minerals and Clean Energy Transformation Compact



BRIEFING ROOM

STATEMENTS AND RELEASES

Australia and the United States commit to enhance bilateral cooperation under a Climate, Critical Minerals and Clean Energy Transformation Compact (the Compact), establishing climate and clean energy as a central pillar of the Australia-United States Alliance. Australia and the United States recognise the importance of addressing the climate crisis as a critical component of the bilateral relationship. The Compact is a framework which is designed to advance ambitious climate and clean energy action this decade, at home and abroad. The framework intends to coordinate policies and investments to support the expansion and diversification of responsible clean energy and critical minerals supply chains, accelerate the development of markets for established and emerging technologies, meet the growing energy and adaptation needs of the Indo-Pacific, and enhance the region's role as a driver of resilient and sustainable global prosperity.

The US will back Oz for COP31 in partnership with our Pacific neighbours.

Supply chains: Oz treated as a US domestic source; but unlikely direct US subsidies to Oz projects;

The Quad investor network, EFA-US EXIM collaboration

4. Australia's Critical Minerals Strategy



Create diverse, resilient and sustainable supply chains through strong and secure international partnerships

We will supply processed critical minerals to diversify global markets and support Australia's access to priority technologies. This includes working with international partners to build secure, resilient and sustainable supply chains that reduce market concentration. We will enhance our high environmental, social, and governance (ESG) credentials and our status as a trusted and reliable trading partner.

Build sovereign capability in critical minerals processing

We will move up the critical minerals value chain and increase Australia's footprint in downstream processing. We will make high-value products that build new industries and strengthen our domestic resilience to supply chain shocks.

Use our critical minerals to help become a renewable energy superpower

We will unlock our vast potential as a major supplier of the critical minerals needed to decarbonise the global economy. Australia's critical minerals sector will help the world decarbonise, including enabling Australia to reach our own legislated targets of 43 per cent below 2005 levels by 2030 and net zero by 2050.

Extract more value onshore from our resources – creating jobs and economic opportunity, including for regional and First Nations communities

This could add \$134bn to Oz GDP and create 262,600 new jobs by 2040 =>
“Proportionate” response:

- \$500m funding for NAIF (**new**)
- \$225m to Geoscience Australia
- \$100m critical minerals development program.
- \$2bn EFA critical minerals facility
- NRF: \$3bn Low emissions tech
- NRF: \$1bn Resources value-add
- \$50m Australian Critical Minerals R&D Hub
- \$57m Critical Minerals International Partnerships
- Powering the Regions Fund: \$1.9bn
- \$3.1bn Australian Apprentices Incentive System
- \$500m Jobs & Skills Councils
- \$105m New Energy Apprenticeships

Another critical minerals review 2026

***Another \$100bn of public capital to crowd-in
\$200-300bn of private capital***

4. Exporting Embodied Decarbonisation

Australia needs to move on from the 'dig-and-ship' view



ASX / MEDIA ANNOUNCEMENT

Wednesday, 2 August 2023

FINAL INVESTMENT DECISION FOR MID-STREAM DEMONSTRATION PLANT

BOARD APPROVAL GRANTED FOR CONSTRUCTION OF DEMONSTRATION PLANT TO PRODUCE VALUE ADDED LITHIUM PRODUCT AT PILGANGOORA.

PROJECT SEEKS TO DEMONSTRATE POTENTIAL TO IMPROVE THE BATTERY MATERIALS SUPPLY CHAIN THROUGH DECARBONISATION OF SPODUMENE PROCESSING, REDUCTION IN TRANSPORT VOLUMES AND INCREASED VALUE-ADD PROCESSING AT THE MINE SITE.

- Independent Life Cycle Assessment studies estimate that converting spodumene using electric calcination when using 100% renewable energy has the potential to reduce calcination carbon emissions intensity by >80%², which would materially reduce carbon emissions in one of the most energy intensive steps of the lithium battery materials production process.
- Delivering a more lithium-enriched mid-stream product has the potential for industry wide benefits including reduced transport of waste, greater value creation and utilisation of the mineral resource and unlocking future assets with limited transport infrastructure.
- Estimated construction costs of \$104.9M will be partially funded with a \$20M Australian Government grant³ with Pilbara Minerals now funding \$67.4M of the remaining budgeted construction expenditure.

Liontown snares Western alliance solution to funding shortfall

Kalgoorlie | [Brad Thompson](#) Aug 7, 2023 – AFR

[Liontown Resources](#) has won backing from a coalition of government finance agencies in Australia, South Korea and the US to bridge a \$300m funding shortfall for its flagship lithium project in Western Australia.

The breakthrough secures the funds needed to complete the \$895m Kathleen Valley project. The finance package could be increased and used for working capital against a background of rising costs in the WA mining sector and [lithium market jitters](#).

Liontown also announced on Monday that it had joined forces with Japan's [Sumitomo Corporation](#) to study the feasibility of building a lithium sulphate plant in WA that would supply a finishing plant in Japan producing lithium hydroxide.

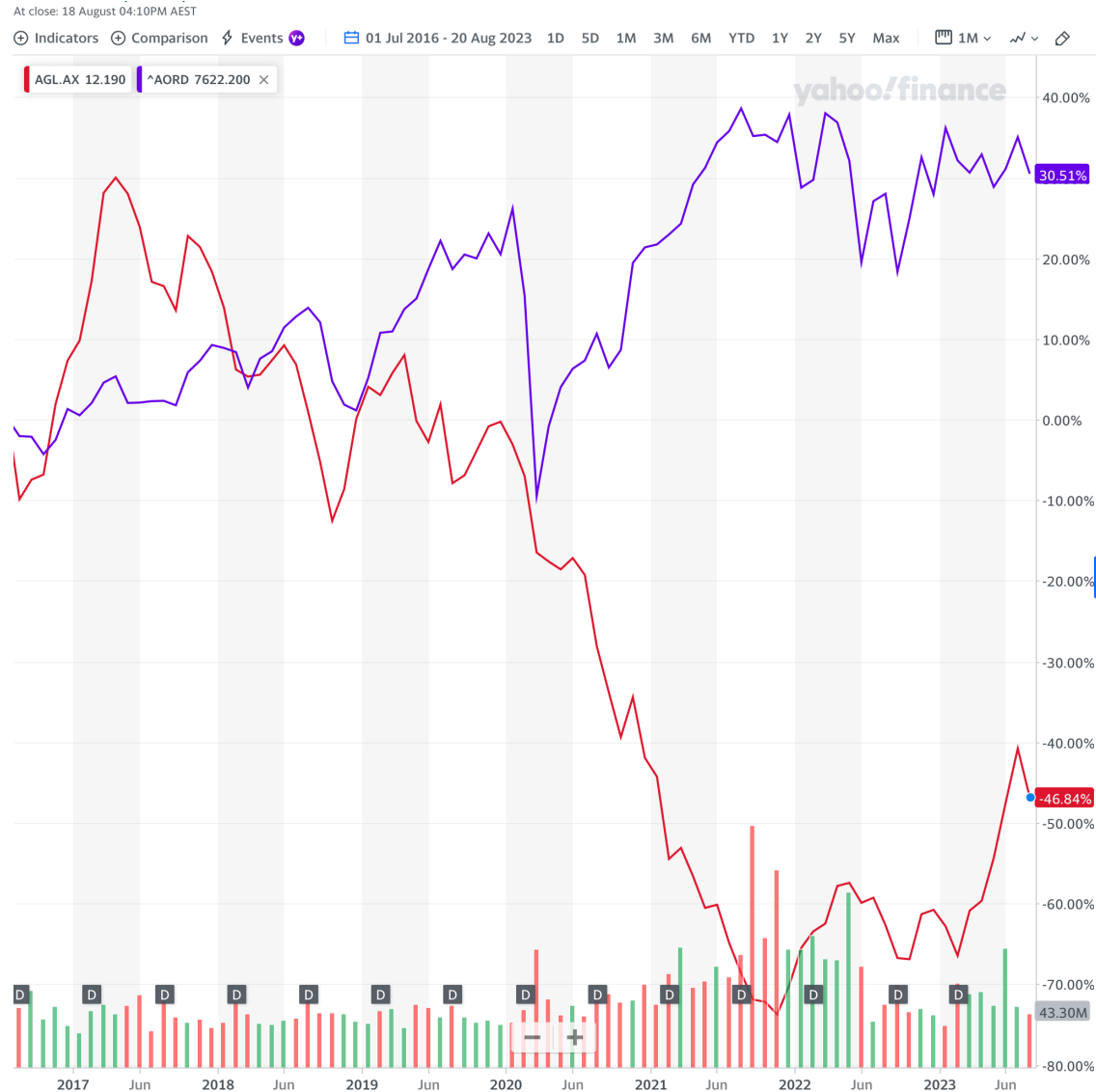
The funding option, although not finalised, gets Liontown closer to its 2024 production target for Kathleen Valley after it last week unveiled plans to start shipping unprocessed lithium to realise some cash.

[Export Finance Australia](#), the [Korea Trade Insurance Corporation \(K-Sure\)](#) and the [Export-Import Bank of the United States \(EXIM\)](#) have issued individual letters of support, underlining the strategic importance Western nations have placed on reducing their reliance on China for battery materials.

Liontown is continuing talks with customers, commercial banks and other government funding agencies about additional finance.

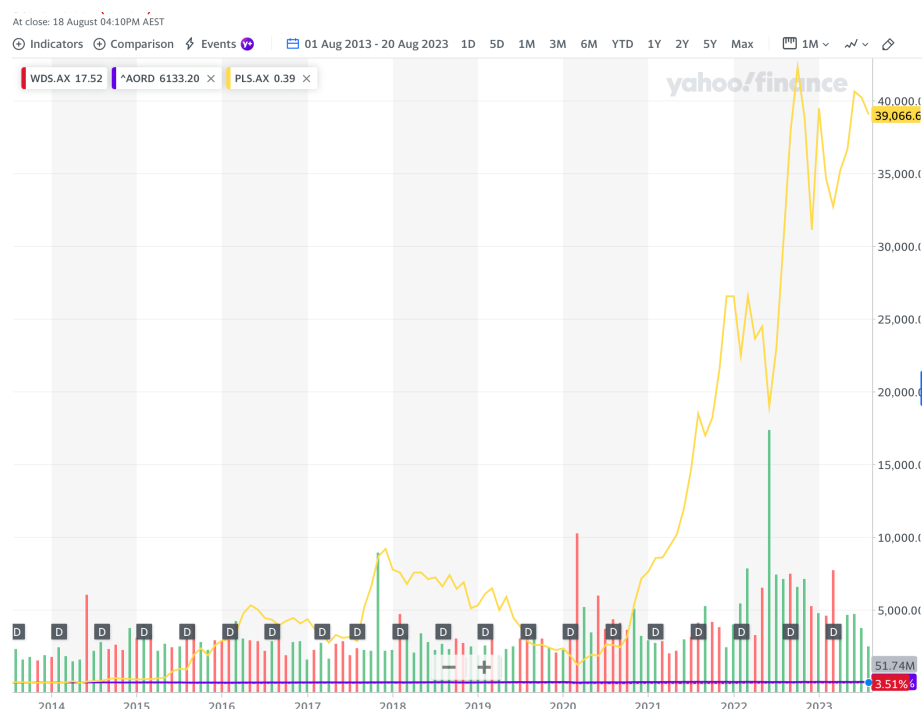
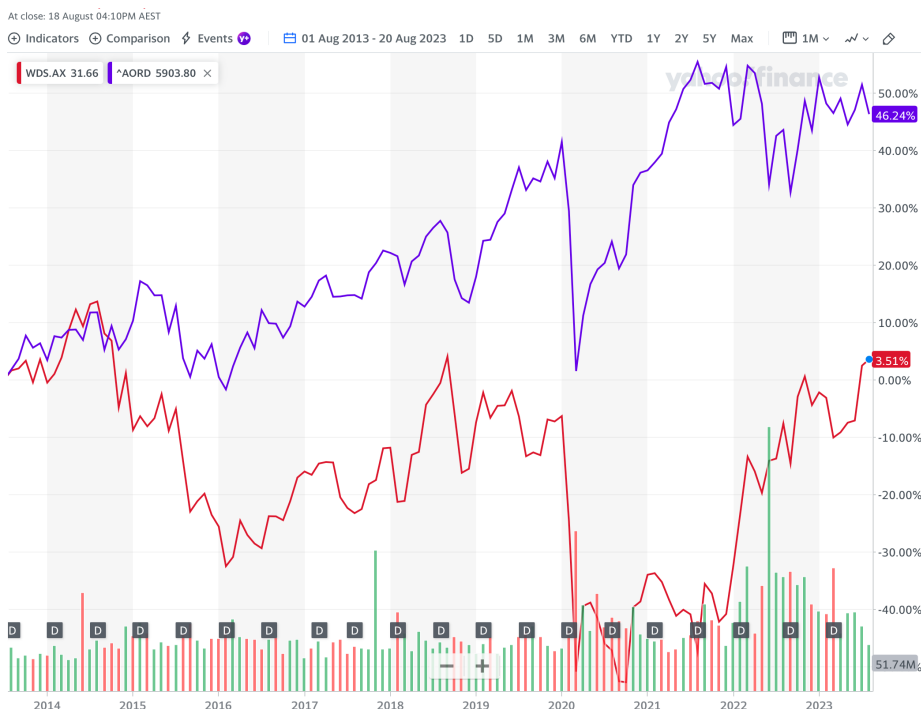
5. AGL

AGL Energy is a example of impact investing when engagement then divestment both failed



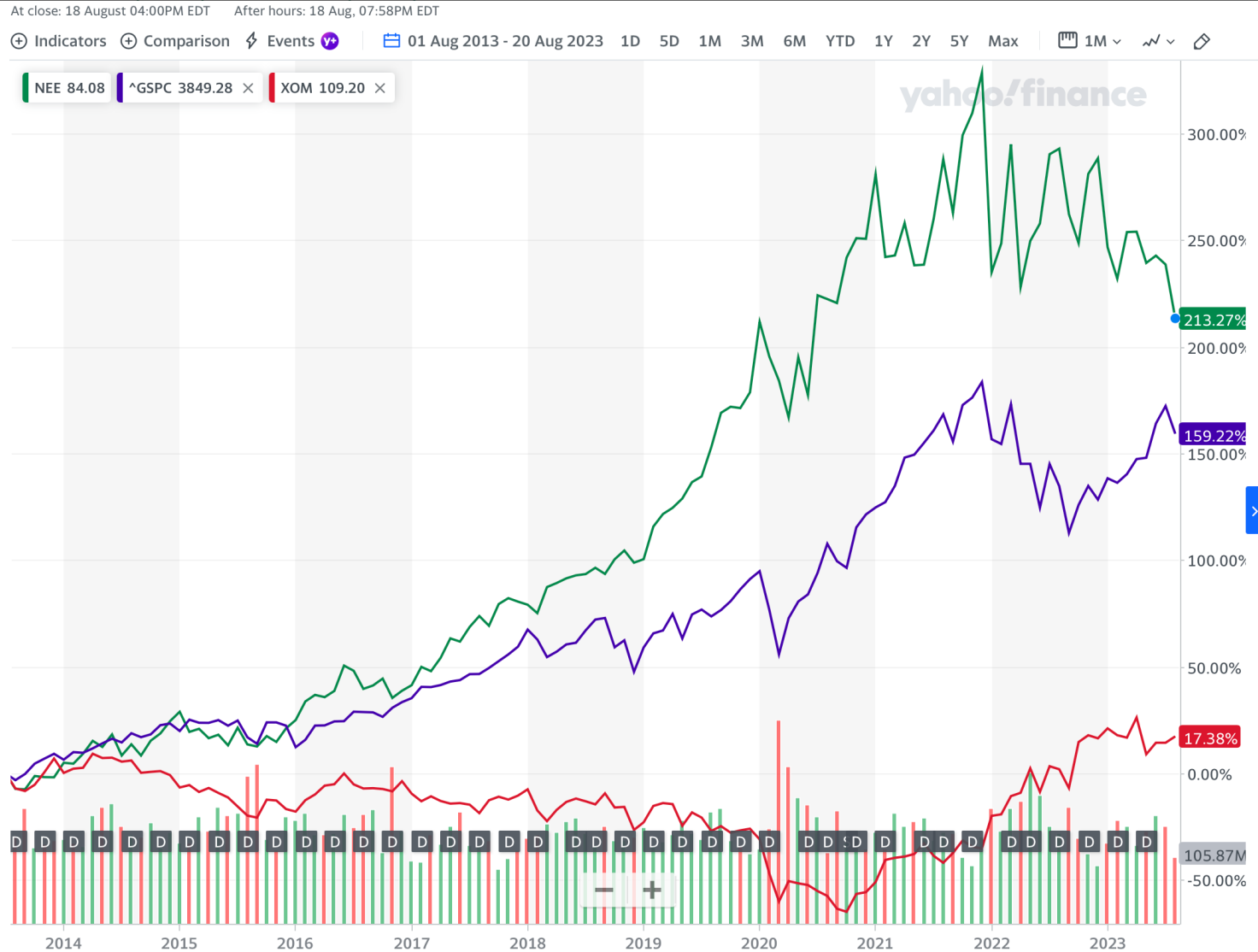
5. Woodside vs Pilbara Minerals

Fossil Fuel Exposures vs Energy Transition – looking through the commodity cycle
(Woodside Energy vs All Ords vs Pilbara Minerals)



5. Nextera vs Exxon

Nextera Energy US vs Exxon vs S&P500: Fossil Fuels vs Electrify Everything



5. Insurance Implications

The Implications of Climate Change are Rapidly Emerging

// There are now
12% of households
experiencing home
insurance affordability
stress //

Report - August 2023

Home Insurance Affordability Update

Actuaries
Institute.



Sharanjit Paddam,
FIA FIAA

Almost one year on from the publication of the Actuaries Institute's Green Paper *Home Insurance Affordability and Socioeconomic Equity in a Changing Climate*, home insurance affordability remains an ongoing and significant issue in Australia.

Affordability pressures have risen for almost all Australian households since the 2022 Green Paper, with increases in home insurance premiums (driven by both higher sum insureds and rate increases) not matched by household income growth. In particular, while the median increase in home insurance premiums over the last 12 months was 28%, the impacts were far greater for the highest risk properties, increasing by more than 50% for the 5% of households paying the highest premiums.

There are now 12% of households experiencing home insurance affordability stress (up from 10% in March 2022) where affordability stress is defined as paying more than four weeks of household gross income towards home insurance premiums. Overall, we estimate that 1.24 million Australian households face home insurance affordability stress compared to 1 million a year ago. The average